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NOTICES OF The Aëronautical Society of Great Britain.

At a meeting of the Council of the Aëronautical Society of Great Britain, held at 53, Victoria Street, Westminster, on Friday, June 15th, the following gentleman was elected a member of the Society:—

Mr. REGINALD MANSFIELD BALSTON.

THE LIBRARY.

The following publications have been presented to the Library:—

By Major B. Baden-Powell: "The Aërial Voyage of Mr. Sadler across the Irish Channel"; "The History and Practice of Aërostation," by Tiberius Cavallo; "My Life and Balloon Experiences," by Coxwell; "Adventures in the Air," by M. de Fonvielle, translated by John S. Keltie.

By Major H. W. L Möedebeck: "Die Luftschiffahrt, ihre Vergangenheit und ihre Zukunft."

By the British Commission of the Milan Exhibition: "Catalogue of the British Section."

The requisite number of entries for the proposed Flying Model Competition not being obtained, it was not possible to hold the competition announced for the Summer Meeting. The next General Meeting of the Society will therefore be held at the Society of Arts, John St., Adelphi, on a date to be announced after the Summer recess.

KITE DISPLAY.

It has been arranged to hold a Kite Display at a convenient distance from the Metropolis at the Summer meeting of the Aëronautical Society of Great Britain in 1907. Full particulars will be announced later.

The Exhibit of Photographs, Prints, and Diagrams illustrative of Aëronautical progress contributed to the Aëronautical Section of the Milan Exhibition by the Aëronautical Society of Great Britain is now on view in Section I.

ERIC STUART BRUCE,
Honorary Secretary.

Aëronautics and Polar Exploration.

It is often said that this country is behind other nations in aëronautical development. It is no doubt true that the fickleness of the British climate and our insular position have to some extent in the past limited the practice of ballooning, though these disadvantages are now diminishing in the light of the more accurate weather forecasts. But even if more advantageous

climatic conditions have given other nations more opportunities for balloon practice and development, many of the greater movements for the extension of aëronautics have emanated from this country. Was not Great Britain the first to establish a society to be devoted to the quest of all knowledge that would lead to the conquest of the air, that very society of which this journal is the official organ? Was it not a British scientist who first firmly established the use of the balloon for scientific research in the higher atmosphere? Had it not been for Glaisher's heroic efforts to press the balloon into the service of science, would the international balloon ascents have been undertaken? In another part of this journal emphasis is laid on the fact that a useful detail of these international ascents emanated from Great Britain—the system of bringing down the recording instruments on ballon-sondes safely to earth by means of parachutes. Electric balloon signalling, too, was developed in this country, and we must not forget that the greatest object-lesson on record of the use of the observation balloon in warfare was evidenced by the British campaign in South Africa.

This journal chronicles yet another example of British initiative in aëronautical development—the use of the observation balloon in Polar exploration by Captain Robert Falcon Scott, the commander of the recent British Antarctic Expedition.

In Captain Scott's address on the subject before the Aëronautical Society of Great Britain in April last, he very modestly spoke of the first use of the observation balloon in polar regions; but the fact that he was the first to look over the great ice barrier in a balloon, even if he saw that there was not much to see, must be ranked amongst the historical aëronautical achievements of the Sons of Britain.

Some were perhaps disappointed to hear that Captain Scott does not think that the use of the observation balloon in polar exploration counterbalances the disadvantage of encumbrance; but it must be remembered that in an exploration vessel every inch of space has to be carefully considered. The steel gas cylinders which were necessary for filling the balloon took up a large amount of space on the Discovery. The sacrifice of space means sacrifice of coal and provisions, and their sacrifice may mean sacrifice of life.

Whatever is to be the fate of the observation balloon in future polar expeditions, it does not, however, seem that aëronautics in the future are likely to be divorced from Arctic and Antarctic exploration. In another part of this journal will be found the principal details of Mr. Wellman's proposed Arctic expedition in an airship. There are many interesting features in his scheme, such as the proposed use of the retardateur and the employment of wireless telegraphy. But, it may be asked, is the navigable balloon yet sufficiently developed to promise safety and success? Have not its limitations in regions known been too apparent to risk its voyage to regions unknown? Time will answer these questions; possibly the preliminary trials at Spitzbergen may do so before an Arctic journey is attempted. But if Mr. Wellman sets out for the North Pole, all students of aëronautics will wish him success and a safe return.

GENERAL MEETING.

The second meeting of the forty-first session of the Aëronautical Society of Great Britain was held at the Society of Arts, on Friday, April 27th. The President, Major B. Baden-Powell, was in the chair.

The minutes of the last meeting were read by the Honorary Secretary.

The PRESIDENT: It is hardly necessary for me to introduce to you Captain Scott, for his name is so well known to us all as being a great one in that long list of British explorers. Many of us have read his most interesting book, "The Voyage of the Discovery," and all I can say is if any of you have not read it, the sooner you do so the better, because it is a most interesting record, and is illustrated by numbers of very interesting photographs.

The Use of the Balloon in the Recent British Antarctic Expedition.

By CAPTAIN ROBERT FALCON SCOTT, R.N.

CAPTAIN SCOTT: Mr. President, ladies and gentlemen, I feel that I must make some apology for delaying the proceedings of the

meeting. I am afraid I have no excuse, except the very lame one that I mistook the hour. I thought it was 8.30 and not 8 o'clock. You mentioned, sir, that I was about to read a paper; I am sorry to say I have no such thing; what I did volunteer to the Honorary Secretary was to spin a yarn. I want to say a few words about, I believe, the only effort that has been made to raise a balloon in the Polar regions, and although I cannot claim to be an aëronaut, yet I did happen to be the first person to have gone up in a balloon in the Polar regions.

I would say a word first as to how we came to have a balloon in the *Discovery*. There is in the south a great wall of ice which most of you have heard of, called the Great Barrier, and in discussing this, for reasons I will show you, we came to the conclusion that one way of looking over that wall of ice was to take a balloon. It is a difficult thing to send a balloon up from a ship, but we were in the hope that we should be able to get it up somehow. Full of this idea I went to Colonel Trollope, a distinguished member of this Society, and he supported me. On his suggestion I went to Aldershot, and I am bound to say Colonel Templer did not smile upon the idea. He seemed to think at first that a sailor was not to be trusted with a balloon. However, he did permit some of my men to go and be trained, and within a week I heard they were doing splendidly, and seemed to know all about it at once, which I thought was a fine tribute to the British sailor. And so after that there were no more difficulties. We got a military balloon from Aldershot—it was one of the ordinary military balloons for raising one man, made of gold-beater's skin, and constructed, I believe, by a secret process, one of the few secrets which we possess. (Laughter.)

Well, this balloon had a capacity of 8,000 cubic feet, and it took up very little room indeed; it went into a small case with the basket as well. The gas was a different matter. We first thought of taking three or four fills for the balloon, but we discovered that the gas cylinders were unwieldy things, so finally we took about two and a half fills, or forty odd cylinders of gas, each cylinder containing 500 cubic feet of hydrogen. They were the most unmitigated nuisance, always in the way throughout the passage, so I shall have to consider that in saying a word or two about the future of balloons in the Polar regions. We sailed away with this balloon. I will show you a slide to refresh your memories as to where we went. (Slide shown.) That is a chart of the South Polar regions. We went to New Zealand and came down to the place marked Victoria Land. On this next slide there is Victoria Land, and this is the great ice barrier, a solid wall of ice, as you see. Sir James Ross, sixty years ago, was the first to see this wall. He sailed down here and could see nothing beyond it, which was most tantalising; so, naturally, by hook or by crook the thing was to look over it. Sir Joseph Hooker, the great survivor of that expedition, remembered this wall, and so was keen on this idea of the balloon to be used for that purpose. Now to show what that wall is like (slide shown) here it is—a long wall running several hundreds of miles. It varies greatly in height, but here it is one hundred feet high. The ice under the water must be five or six times as deep as the height above the water to bear it up, so that it is a pretty solid wedge of ice. Now you can imagine better how that idea of wanting to look over it came; from the mast of the ship you could not see over the top, and that is why we wished to have a balloon. (Slide shown.) Here is a closer view of the wall. It is very wonderful the way in which the snow lies in strata.

Well now, we go back to the map to show you what happened in our case. We cruised along this wall. We found it a different thing from what Sir James Ross described. Along the edge there were some places where there were inlets, and we thought that the ice at these points was lower than at the outer part. So on that account I determined on February 4th to go and search for a place to raise our balloon. We got into a little inlet in the barrier, and there is the ship lying inside it. (Slide shown.) The edge of the ice was very definite; you could step off the side of the ship on to the snow surface. We lay here one night, and the next day we started to inflate the balloon. Our balloon brigade mustered out in the snow. They spread a large square of canvas, and then brought the cylinders out. A number of small rubber pipes were joined to a single pipe which led into the balloon. This operation had to be carefully

done on the canvas; then the valves of the cylinders were opened and the gas poured in. The gold-beater's skin of such a balloon has to be treated with care, because it sticks, and as the balloon is inflated you have to unstick the folds. With cold fingers and in that atmosphere we tore it several times, but when this happened, we merely had to take a piece of the skin and put it on over the hole. Thus finally we got the balloon up in the position shown. That slide shows it with the proper allowance of gas in it. (Slide shown.) The proper allowance of gas was sixteen of these cylinders, and when we had exhausted all the sixteen into it, the balloon remained like that, and not in a condition to go up. The reason is the gas in this cold climate becomes of smaller bulk and does not fully inflate the balloon. We exhausted three more cylinders into it, making 9,500 cubic feet of gas altogether. This rope which you see here was laid from a winch in the ship—a good strong wire rope. (Slide shown.) The slide shows the first man to go up in a balloon in the Polar regions, and that man was exceedingly frightened at the time. I thought the car was a most extraordinarily inadequate thing. I had expected it to come up right round me instead of which it came up only to my waist. Well, they eased away this rope, and away I went up, and then I stopped at about six hundred feet, and somebody below, one of those balloon experts, shouted "sand." I had not got any, but there were several bags filled with snow, so I threw them out, with a not very astonishing result; of course, he had meant me to pour it out gently, and if you throw it out like I did you go up with extraordinary rapidity, and then the rope catches you, and you come down with a jerk. Well, eventually I got up to eight hundred feet, and then, unfortunately, the wire rope proved too heavy to allow of further ascent.

Here is a picture taken from the balloon. (Slide shown.) There you see the square of canvas on which the balloon was inflated. Our object was to see what lay to the south. What you could see was that this surface of snow ran on in long, undulating waves. You can see some indication of these long waves. They ran from east to west. A picture taken from one thousand feet shows very little indeed.

Here is another picture taken from the balloon. It is remarkable because it shows the way in which the snow is blown into curious patterns. (Slide shown.)

The question is, is a balloon useful for Polar regions? What did we see? Not very much. The difficulty is that where you are looking over snow surfaces there is so little contrast that it is impossible to make out what lies in the distance. You can get a distant view with telescopes on land, but in snow, as I have said, the contrast is so small that you really can see nothing. There is one way, and one way only, to explore the nature of a snow surface, and that is to go there and walk over it. I want to make that point quite clear, and this slide shows it better. (Slide shown.) This is taken from a hill not so high as we were in the balloon, but still three hundred or four hundred feet high. Away in the distance it looks in the picture as though there were a great plain running back to these mountains; but when we came to travel over it we found all sorts of disturbances, long ruts and rubble, and immense upheavals on the ice itself, none of which can be seen in the picture. It is not much use having a balloon if you cannot see from it. So I think, on the whole, considering the trouble which those cylinders were to us, considering the weight and the space they occupied, the number of people who lost their temper over them, and the little we got out of it all in the end, I would not advocate a balloon being taken in any future Polar expedition, though I have no wish to remain the only as well as the first man to go up in a balloon in the Polar regions.

I think that is the end of our ballooning experience, so I thank you very much for listening so patiently to my story, and will sit down and give place to the more serious business of the evening.

Col. CAPPER: As far as I can judge from my experience of captive balloons, I do not think you could hope to make out any real details of a landscape. The obstacles would not be visible except closely seen. The only object of taking a balloon would be to see whether there were hills; I do not think you could expect to get more than Captain Scott got out of it.

The PRESIDENT: I think it merely remains for me now to ask you to give a cordial vote of thanks to Captain Scott for his interesting address. It is one that is very valuable, because what he did with the balloon is the only occasion on which a

captive balloon has been used for observation in the Antarctic regions. We must not forget poor André made a balloon ascent, but we have not been able to hear the result of that, so this remains the only record we have of any aëronautical work in Polar regions. I am sorry it is an experience that is hardly likely to be repeated. I will ask you to record your vote by acclamation. (Applause.)

The Recent Experiments Conducted by the Wright Brothers.

By SIR HIRAM S. MAXIM.

I think we should all congratulate ourselves on the great success of the experiments conducted in the United States by the Wright Brothers. These experiments have demonstrated in a most conclusive manner that it is not only possible to navigate the air, but that the only chance of success is with machines heavier than the air. It can no longer be said that flying machines are impossible; a flying machine has at last been made which actually rises and travels through the air at a speed of about forty miles an hour without the aid of a gas bag. This machine marks a distinctly new epoch in aëronautical science. The first flying machine has come, and, whether we like it or not, it has come to stay. No less a genius than Edison himself has pointed out its potency as an instrument of warfare. It is impossible to over-estimate the changes that will take place during the next ten years in everything relating to civilised warfare. The flying machine must become a very important factor, and it behoves all the civilised nations of the earth to lose no time in becoming acquainted with this new means of attack and defence. The nations which do not appreciate the importance of this instrument of destruction will be very soon left in the lurch. The French have always been the most progressive nation on earth in everything relating to warfare, and the French Government was the first to expend large sums of money with a view of navigating the air. No sooner had the Wright Brothers made a success of their machine than it was eagerly sought after by the French Government, and I am of the opinion, notwithstanding that the first decided success has been met with in the United States, that in the immediate future the French will lead the van in everything relating to the subject of artificial flight.

Experiments in flying machines are enormously expensive, as a rule too expensive to be conducted by a private individual, but in France the Government is only too ready to furnish the necessary money, and now that the Americans have shown the world how to do it, it will not be long before our friends across the Channel will be supplying their army with veritable flying machines. If one had taken up the subject thirty-five years ago it would not have been as easy as now. Strong aluminium and strong and thin steel tubes were not available at that time, but these are of small importance compared with the motor. During the last dozen years perhaps a million pounds sterling has been spent in the various countries of the world on experimental work relating to internal combustion engines, and always in the direction of great lightness in proportion to the power developed. We have to thank our friends the automobile makers for this advancement. It is now possible for the experimenter on flying machines to practically find the motor ready made, that is, the motor is ready at hand which will develop the power of a horse with the weight of a common barnyard fowl. It is very gratifying to me to know that the machine built by the Wright Brothers has been built on the same lines that I experimented on years ago; like my machine it has superposed aëroplanes propelled through the air by a screw. At the time of making my experiments the high power petroleum engine had not been invented; I was forced to use steam. My machine was too large and I did not have sufficient room to conduct my experiments; however I did prove the lifting effect of aëroplanes. I found that it was possible even with a steam engine to make a machine that would lift more than its own weight with three men on board. In the autumn of 1904 I conducted some experiments at the Crystal Palace with very sharp and thin aëroplanes, very slightly concaved on the under side and placed at a slight angle above the horizontal. These aëroplanes were driven through the air at an enormous velocity around a circle about 300 ft. in diameter, when it was found that the lifting

effect was much greater than anyone had ever supposed. The lifting effect of aëroplanes is very much influenced by the motion of the air through which they are driven. In my Baldwin's Park experiments it was found that with a wind of no greater velocity than four miles an hour blowing across the track the lifting effect on the windward side would be no less than say 1,000 lbs. greater than on the lee side. It was originally intended by me to provide all the boats on my captive flying machines with aëroplanes, and to use about 200 h.p. for driving the ten boats; aëroplanes were placed on the first boats, but one day, when the wind was blowing forty miles an hour, one of the boats was lifted to a great height when travelling against the wind only to fall very quickly when it was travelling with the wind. The engineers of the L.C.C. were present, and I think somewhat alarmed at what they saw; it was only too evident that they would not pass such a machine. The aëroplanes were too dangerous to use except in a dead calm; they were taken off, and these machines ceased to be captive flying machines and degenerated into-roundabouts in everything but name. I am, however, of the opinion that although the aëroplane system is the first to meet with success, still it is not the only system, and before many years I think we shall have machines made on a system which will be more manageable, less dangerous, and which will approximate nearer the flight of birds; in any case, the Wright Brothers deserve our warmest praise and congratulations.

The PRESIDENT: Has any gentleman any remarks to make on this subject?

Mr. NICHOLSON: I should like to be allowed to say that I think we are all indebted to Sir Hiram Maxim for the wonderful work he has done, and we should, I think, tender to him a most hearty vote of thanks for the trouble and expense he has been put to in the interests of this delightful science. (Applause.)

Mr. CODY: I can only second our friend's opinion of Sir Hiram's work. I have never had the pleasure of seeing his flying machines, but I agree with his idea as to aëroplanes lifting as they do. I do disagree with almost all science as regards the spread of a flying machine. A good machine will not fly and lift more than half a pound in a square foot. The Brothers Wright claim to have flown with 900 pounds, and 600 square feet. I doubt whether the Wright Brothers lifted and flew with that weight. I shall try to make a machine weighing 1,000 pounds, with 3,000 square feet of lifting surface, and capable of discharging lumps of lead or dynamite, or anything else to the extent of 500 pounds, that is to say, when the machine is fully loaded, it will carry 1,500 pounds, and be capable of flying with 500 pounds less.

Col. FULLERTON: I should like to ask the speaker what the actual surface of the Wrights' machine is. I did not quite catch what he said.

Mr. CODY: I have been told by Mr. Alexander that it weighed about 900 lbs., had about 600 square feet of lifting surface, and had a 13 or 14 h.p. engine on it.

Mr. MOORE-BRABAZON: The Wright Brothers were the first who had this aëroplane, and they worked it by altering the weight. They had no arrangement for altering the equilibrium.

The CHAIRMAN: In this matter we all feel very much the uncertainty in which we are at present placed as to the details of the Wrights' machine. It seems to be very well authenticated that they have flown through the air and remained up for a considerable time. There is an interesting letter from Mr. Octave Chanute which has been reproduced in the "Automotor Journal," and I have had a letter myself from Mr. Octave Chanute in which he does not give many details, but he describes having seen some of these ascents, and we know how truthful he has been in his accounts of the kind. Mr. Chanute tells me that the Wright Brothers are constructing a second machine which will doubtless be a great improvement on their first.

There is one point Sir Hiram mentioned, and that is about light engines, light motor engines. Some light engines have been produced in France by the Boucher Co., and there is one I shall hope to get shortly which gives 12 h.p. and weighs only 52 lbs. They have made some of their engines of a lighter weight, under 3 lbs. per h.p. This is lighter than we ever heard of a few years ago. A light engine is a very great step towards the practical solution of a flying machine. One of the points Mr. Chanute has pointed out in his letter as regards the Wright Brothers' machine is that these gentlemen have not only created a record in inventing a flying machine, but also in being able to build a machine and experiment with it in the open air without the accounts of it getting into the papers.

In America, more than in England, it is difficult to keep things out of the public press.

I will ask you to record your vote of thanks to Sir Hiram Maxim for his interesting paper.

The vote was carried unanimously.

The PRESIDENT: There is another paper down on the programme by Mr. Weiss, but you will be sorry to hear that he has had a family bereavement, and his paper will be postponed to another day. We have another paper which will take its place on "The Relative Weight and Span of Birds," by Major Brocklehurst. But before that paper is read a series of photographs will be shown on the screen illustrative of the various types of heavier than air flying machines that have been devised.

The photographs were then shown and explained by the Honorary Secretary, Sir Hiram Maxim pointing out many of the interesting details disclosed by the photographs of his large machine.

Mr. CODY: I want to call attention to an expression that has been used as to the Brothers Wright inventing the plane to rise or fall on a flying machine. It shows how careful we should be, since Sir Hiram Maxim had that very plane on his machine before the Brothers Wright touched these things. I have six slides which I wish to present to the Society to use in any of their demonstrations. These slides are my feeble attempts to glide, and may be of interest in such demonstrations as these. I have undoubtedly made a great success with a kite, but I would not venture to say I was the originator, but I believe that I have accomplished more in kite flying than anybody else. I do think I have convinced the world of that.

Sir HIRAM MAXIM: What does Mr. Cody think of having the aëroplane tilted? If I put something on the air, it always kept right side up in that way.

Mr. CODY: If anybody has seen a picture of my kite they will not need my answer. I admit it is the first time I have ever seen a picture of Sir Hiram Maxim's machine. It seems strange, we are personally great friends, but I have never seen the machine. I should like to study it, but I do not suppose I shall have the opportunity. Of course, I do not say anything about the rudder, because I wish to use it myself, but the fact still remains that Sir Hiram had it on his engine before the Brothers Wright made their machine.

Sir HIRAM MAXIM: I have shown that, by having this aëroplane, if the machine tips over the aëroplane keeps it from tipping over sideways. I not only had it in the front, but I had an arrangement by which this rudder was in one direction and the other one the other way, and if anything happened it came down to the ground.

Mr. Cody then exhibited the six photographs of his gliding machine.

1 and 2. Putting the machine together.

3. The machine complete.

4. Carrying the machine to place of flight.

5. Just before flight.

6. Gliding.

In describing these photographs Mr. Cody explained that the machine has 800 feet of lifting surface, and is 51 feet across. The rudders are at the bottom of the machine, and are planes that will lift and rise. If one lifts the other descends.

Sir HIRAM MAXIM: Before I leave I should like to ask for a solution of one point. I was at the Crystal Palace, and I saw Mr. Cody flying his machine. The wind was blowing steadily, and the machine came over our heads, and I thought it had gone a little further into the wind than we were standing ourselves. What was the reason of that?

Mr. CODY: As I recommend gliding to be done, a glider should be flown as a kite, and the rise and fall rudder so arranged as to make a machine lift and glide forward. Perhaps I had weights in the front part of the machine, and that is what made the thing fly over our heads. This machine was not a success in my opinion, although in the opinion of some people it was a success.

The Relative Weight and Span of Birds.

By MAJOR R. BROCKLEHURST.

I thoroughly agree with a remark made by Mr. Cody at the December meeting of the Aëronautical Society, namely, that a machine need not have a certain weight for a certain spread. And this is confirmed by weighing and measuring various birds.

Nevertheless, there must be some general proportion between the weight of a bird

Table showing Weight and Span of various Birds.

Formulæ:—Weight $= \frac{\text{Span}^2}{5}$; Span $= 2\frac{1}{4}\sqrt{\text{weight}}$.

NAME OF BIRD. F. F. Denotes "Free Flier."	Actual weight in lbs.	Normal Weight for Span.	Actual space in feet.	Normal Span for Weight.	Percentage of	
					Overspan.	Underspan
1. Condor (F.F.)	36	(39)	14	($13\frac{1}{2}$)	3·7	—
2. Albatross (F.F.)	25	(45)	15	($11\frac{1}{4}$)	33·3̇	—
3. Wild Swan	24	($12\frac{3}{4}$)	8	(11)	—	27·27
4. Pelican	21	(20)	10	($10\frac{1}{4}$)	—	2·44
5. Golden Eagle (F.F.)	16	(16)	9	(9)	—normal—	
6. Great Northern Diver	12	(5)	5	($7\frac{3}{4}$)	—	35·48
7. Sea Eagle (F.F.)	9	($9\frac{3}{4}$)	$7\frac{1}{4}$	($6\frac{3}{4}$)	7·4	—
8. Cormorant	8	(4)	$4\frac{1}{2}$	($6\frac{3}{8}$)	—	29·41
9. Gannet	7	(7)	6	(6)	—normal—	
10. Osprey (F.F.)	5	($5\frac{1}{2}$)	$5\frac{1}{4}$	(5)	5 0	—
11. Egyptian Goose	5	($3\frac{1}{2}$)	$4\frac{1}{4}$	(5)	—	15·0
12. Black-backed Gull (F.F.)	5	($6\frac{1}{2}$)	$5\frac{3}{4}$	(5)	15·0	—
13. Green Cormorant	4	(3)	$3\frac{5}{6}$	($4\frac{1}{2}$)	—	14·81
14. Heron	$3\frac{1}{2}$	($5\frac{1}{2}$)	$5\frac{1}{4}$	($4\frac{1}{4}$)	23·53	—
15. Red-breasted Goose	3	(3)	$3\frac{5}{6}$	($3\frac{7}{8}$)	—normal—	
16. Sheldrake	3	($2\frac{1}{2}$)	$3\frac{1}{2}$	($3\frac{7}{8}$)	—	9·68
17. Kite (F.F.)	$2\frac{3}{4}$	(6)	$5\frac{1}{2}$	($3\frac{3}{4}$)	46·6̇	—
18. Raven	$2\frac{3}{4}$	($3\frac{3}{4}$)	$4\frac{1}{8}$	($3\frac{3}{4}$)	15·38	—
19. Buzzard (F.F.)	$2\frac{1}{2}$	4)	$4\frac{1}{2}$	($3\frac{1}{2}$)	28·57	—
20. Cock Pheasant	$2\frac{1}{2}$	($1\frac{1}{4}$)	$2\frac{1}{2}$	($3\frac{1}{2}$)	—	28·57
TOTALS.	197	203	$127\frac{1}{4}$	$127\frac{7}{8}$	178·58	162·66

and the span of its wings from tip to tip. In order to try to find out what this is, I drew up the enclosed table of 20 birds taken at random. The figures for the pelican are taken from Mr. F. H. Wenham's interesting paper published in last October's "AËRONAUTICAL JOURNAL." The cock pheasant was weighed and measured by myself. But, for the other birds, I have had to content myself with the greatest *normal* weights and spans recorded in books of reference.

According to this table, the following formula gives very fair results:—

$$\text{Span in feet} = 2\tfrac{1}{4}\sqrt{\text{Weight in lbs.}}$$

and conversely:—

$$\text{Weight} = \frac{\text{Span}^2}{5}$$

Of course, this is simply a deduction from the figures shown in the table, and does not claim to be anything else.

Of the 20 birds shown in the table, the following eight appear to conform roughly to this rule:—Condor, pelican, golden eagle, sea eagle, gannet, osprey, red-breasted goose, and sheldrake.

The black-backed gull and the raven, which are both overspanned, and the Egyptian goose and green cormorant (both underspanned), show moderate results.

Of the remaining eight birds (which differ very much from the rule) four are overspanned, viz., the albatross, heron, kite, and buzzard; while the wild swan, great northern diver, common cormorant, and cock pheasant are underspanned.

At least eight of the birds mentioned are "free fliers," or, in other words, they can (and often do) fly without flapping their wings, in spite of all that has been said to the contrary. Practically, the albatross and all the great vultures are content with that form of flight alone, and they very rarely find it necessary to alter it. The gulls also, and several other birds, make use of it at times, usually against the wind. This free flight is quite different from the gliding of a cock pheasant, for instance, or, rather, it is probably a development of it.

Most of the "free fliers" appear to be more or less overspanned, and their wings are long and narrow. But those birds which have not this power are usually underspanned. There is, however, one remarkable exception in the heron. This bird, although he looks big, has a half-starved body, and rarely scales more than $3\frac{1}{2}$ lbs. But his wings are not only very long, but also very wide. And yet he has a laboured flight, as if his wings were too big for his weight. In fact, he seems to feel this himself, for instead of flying with his neck stretched out like a cormorant or wild duck, he has a curious habit of arching it, as if to concentrate more weight at the base of his wings.

However this may be, it is quite certain that all birds require a considerable amount of weight in order to fly, and if they had not sufficient weight they would be simply blown away like a feather.

A man who weighs with his machine, say, 256 lbs., would require (according to the formula) a single span of 36 feet, more or less. With a superimposed surface, as in the Wright gliding machine, the span ought to be much less. But that part of the wing which is farthest from the weight is the part which counts most, or does most work. Therefore, although the span of a machine (and, consequently, its weight) can be much reduced by the use of superimposed surfaces, yet the gain is not as great as might be expected, and the best part of the wing is sacrificed for a somewhat indifferent substitute. It is the old question of profit and loss, which every inventor must decide for himself.

The PRESIDENT: This seems to be an interesting subject. If we want to get at the surface and proportions that are desirable in a flying machine, it is valuable to study nature as a guide. I will ask you to record your thanks to the author of the paper, and to our Honorary Secretary for reading it.

Colonel CAPPER: I would like to say I had the pleasure of meeting the Brothers Wright, and they told me a rather curious fact about their machine. I have every belief that what they claim their machine has performed it has performed to the last inch. They told me they found when they were driving the machine with the motor, they only had to put on 80 pounds of sail power to make it fly better. It did better with 80 pounds dead weight than it did without. It is, to a certain extent, adjustment of weights. They were so convinced of the truth of that, that they were not concerned in cutting down weight. If there is the least chance of any danger, there is no worry at all about piling on extra weight.

Note on a Communication from Mr. A. Lawrence Rotch on the First Registration Balloons in America.

By ERIC STUART BRUCE, M.A., Oxon.

The Aëronautical Society of Great Britain has lately received a communication from Mr. A. Lawrence Rotch, the Director of the Blue Hill Observatory, on his recent observations with ballon-sondes, at the St. Louis Exhibition, and the following note has been compiled from this communication:—

Mr. Lawrence Rotch states that although the successful experiments with kites at Blue Hill led to the extensive use of kites for meteorological observations in various countries, ballon-sondes were not used in America until 1904, when Mr. Rotch was enabled to make a number of ascents at St. Louis, through the co-operation of the management of the Louisiana Purchase Exhibition. A grant of 2,500 dollars was authorised, but only about half this sum was spent for apparatus, travelling, and living expenses.

The type of balloon used was the small indiarubber balloon devised by Dr. Assmann, the Director of the Royal Prussian Aëronautical Observatory, and made by the Continental Caoutchouc and Gutta Percha Company, of Hanover, Germany. The balloons used, had an initial diameter of approximately six feet when inflated with 100 cubic feet of hydrogen gas, and, carrying parachute and instruments, exerted a net lift of nearly two pounds. Being closed at the mouth, they rise at an almost uniform rate of speed, expanding meanwhile, and they burst at a height which is dependent on their initial distension.

The Richard recording instruments are attached to a parachute covering the top of the balloon. The parachute moderates the fall of the instruments, which reach the ground comparatively near the point of departure. The fact that all but one of the 23 balloons and instruments dispatched were found and returned shows the efficiency of the arrangements, as well as the excellent topographical situation of St. Louis for this work.

During the month of September, 1904, four ascents were made, all the balloons falling about 50 miles east of St. Louis, within a distance of 15 miles of one another, and at the maximum height of ten and a half miles, a temperature of —62° F was recorded. Another series of ten ascents was made in the latter part of November and the first days of December, mostly after sunset, to avoid the possible effects of insolations. Owing to the stronger air currents at this season, two of these balloons travelled with a mean velocity of more than 100 miles an hour, and all but one fell within the eastern half of a circle, having St. Louis as its centre, and a radius of 280 miles. The exception was a balloon which did not rise above the surface wind. Generally, the drift was away from the areas of low barometric pressure at the ground, thus confirming the theory of the outflow of air above them. An extreme height of almost ten miles was attained, and a temperature of —76° F was found once, somewhat below seven miles.

Mr. Rotch states, that in order to continue these observations during the winter, he carried out, at his own expense, another series of nine ascents during the latter part of January, 1905, and on the days of the International ascents in other countries, in February and March, one of these balloons was lost, but the others fell nearly within the semi-circle described above. Several of the records are incomplete, owing to the stoppage of the clockwork, and another was obliterated by the finder; but a height exceeding ten miles was indicated, and the extraordinarily low temperature of —111° F was registered at a height of about nine miles, during the prevalence of a high barometric pressure at the ground.

In connection with Mr. Rotch's experiments with ballon-sondes, it is satisfactory that the plan of bringing down the recording instruments to earth by a parachute has been found to be so practical and useful. It will be remembered that at the meeting of this Society on April 15th, 1901, I had the privilege of being the first to propose this plan to the members of this Society, when I experimentally demonstrated my remarks. I repeated this proposal in a paper communicated to the Berlin Congress of the International Aëronautical Commission. Germany, and it is to her credit, has indeed been the first to practically utilize the suggestion, but Great Britain must claim its origination.

The PRESIDENT: This seems a very interesting paper, and strikes me as containing some extraordinary records.

I think that ends our proceedings.

Mr. E. P. FROST: Ladies and gentlemen, I am sure you will one and all respond to a vote of thanks to our worthy President, Major Baden Powell.

Dr. H. R. MILL: I have great pleasure in seconding that.

The vote of thanks was carried unanimously, and the proceedings then terminated.

The Wellman Balloon Expedition to the North Pole.

The attempt of Mr. Wellman to reach the North Pole in a navigable balloon certainly promises to be amongst the most interesting aëronautical events of the current year. This expedition is being financed by Mr. Victor Lawson, the principal owner of the Chicago *Record Herald*, and a life member of the National Geographical Society, and its cost is estimated at over 250,000 dollars. The scheme has the approbation of the American National Geographical Society, whose Board pronounced that Mr. Wellman's plans are carefully and thoroughly considered, and give good promise of success.

The Society has appointed Major Henry B. Hersée to be the scientific representative of the National Geographical Society in connection with the expedition, and he will accompany Mr. Wellman on his aërial voyage to the Pole.

To M. Louis Godard has been entrusted the construction of the large airship. Its length is 164.04 feet, its greatest diameter 52.49 feet. It has a surface of 21,098 square feet, and a volume of 224,244 cubic feet. Its highest lifting power is estimated at 16,000 pounds. The weight of the airship, complete with steel car, motors, and machinery is 6,600 pounds, and the weight of the crew, instruments, wireless and other apparatus, gasoline, etc., 9,400 pounds.

The duration of inflation is hoped to be 15 to 20 days.

The airship is provided with two motors, one of 50-horse power, and another of 25-horse power, driving two screws and giving speeds of from 12 to 15 statute miles per hour.

The steel car is 52.5 feet long. There is an enclosed engine-room and cabin for the crew, and an important feature of the scheme is the steel boat, which is suspended below the car. This will serve as a working deck for the manipulation of the guide rope, equilibreur, and retardateur, and for storage of gasoline, and in case of any accident happening to the airship, it will be used by members of the crew in sledging their way back to the headquarters.

The gas bag in its greatest diameter, where the pressure is 45 pounds to the square foot, has three thicknesses of fabric, two of cotton material, and one of silk, with three coatings of rubber. All three are consolidated into one fabric, giving a tensile strength of 575 pounds per square foot. In the next zones, where the pressure is reduced, a lighter silk is used to reduce the weight of the envelope, and in the outer sections, the silk is altogether omitted.

Mr. Wellman is placing much reliance on the retardateur or dragging anchor, a device calculated to offer the maximum of resistance in proportion to its weight, and by this means to drift slowly with an adverse wind. The retardateur consists of a steel cable, provided with small projections like hooks or rings, calculated to give resistance equal to the pull of the airship in a wind of about 12 to 15 miles per hour.

The plan of drifting slowly with the retardateur will take the place of firm anchorage. It is estimated that with a wind of 10 to 12 miles an hour, the vessel will remain approximately stationary in the air, perhaps drifting half a mile to a mile per hour. In a wind of 15 miles per hour, the drift should be 5 miles per hour, in 20 miles 8 miles per hour. Should the wind be 30 miles per hour, the driftage should be 18 miles per hour.

In June the apparatus of the expedition was assembled at Tromsoe, in Norway, where the iceship Frithjof was in readiness. The vessel started for Spitzbergen at the end of the month. Mr. Wellman expected to establish his headquarters at Dane's Island, in Spitzbergen, early in July. A huge shed will be constructed for the airship.

During the latter part of July, trials with the airship will be undertaken. If these preliminary trials are successful, an effort will be made to reach the Pole this year, but if delay is advisable, the attempt will be postponed till next year.

An important feature of the plan will be

the attempt to maintain wireless telegraphy communication between the Arctic regions and the outer world. Wireless telegraphy stations will be established at Hammerfest, Norway, in touch with the Atlantic cable. Station two will be at the expedition headquarters, in Spitzbergen, and it is expected that constant communication between these points and 600 miles apart can be maintained. Station three will be on the airship, and it is conjectured that messages can be sent from the neighbourhood of the Pole itself, to headquarters at Spitzbergen, and thence to Hammerfest.

The Austrian Balloon Voyage across the Channel.

To Austria belongs the credit of the latest balloon voyage across the Channel. Towards the end of May last, the Management of the Austrian Exhibition at Earls Court, received an intimation that Prince Jaime de Bourbon and The Chevalier de Korwin, the commander of the Austrian Military Balloon Department, were on their way to England to make a balloon journey across the Channel to Austria, and wished the ascent to be made from the grounds of the Austrian Exhibition at Earls Court. The Management of the Exhibition immediately communicated with the Honorary Secretary of the Aëronautical Society of Great Britain, so that the most convenient site might be selected for the ascent in the Exhibition grounds, and preliminary preparations made. On the arrival of the Prince at the Carlton Hotel, he was met by Colonel Templer, the Instructor of Military Ballooning at Aldershot, Mr. Eric Stuart Bruce, and the Honble. C. S. Rolls, and various details concerning the proposed trip were discussed. Unfortunately for the realization of the plans of the Prince, adverse winds prevailed during the time of his stay in this country, and in vain the necessary north-west wind was awaited. Another circumstance occurred which would have delayed the trip a day or two even if the favourable wind had blown, that was the non-appearance of the balloon, whose transit to this country was delayed.

The engagements of the Prince abroad rendered it impossible for him to wait out the unfavourable winds, but the Chevalier de Korwin remained behind. At last the obstinate air-currents changed their course, and on June 2nd, the Meteorological forecasts, which had been sent daily from the Meteorological Office to the awaiting aëronauts, announced the welcome north-west breezes. Immediately steps were taken to inflate the balloon. Several cylinders of pure hydrogen gas had been sent from the Aldershot Balloon Factory for filling the balloon of 45,000 cubic feet, but it was found necessary to supplement the supply of pure hydrogen with ordinary coal gas.

The ascent was made at 5.10, by the Chevalier de Korwin alone. Owing to variable winds, which at one time threatened disaster to the intrepid aëronaut, the passage across the Channel took six hours. Owing to the delay, there was no course left but to abandon the project of making a journey to Austria. The descent was made near Boulogne, at one in the morning.

The photograph, here reproduced by the courtesy of the editor of the *Car*, represents Prince Jaime de Bourbon and party on his arrival at the Austrian Exhibition. Amongst other personages in the group, are the Chevalier de Korwin, Mr. Eric Stuart Bruce, and the Honble. C. S. Rolls.

Across-Channel Communication by Kite.

By S. H. R. SALMON, M. Aër. Soc.

On the 10th February, 1900, a kite flown by M. Delcourt, at Calais, France, broke away, and, dragging its line through the sea, landed at Burmarsh, England, a distance of 35 miles.

This suggested to me to test the possibility of delivering a message in France from England by kite.

On the 14th April, 1906, in an E N E wind, blowing about 30 miles an hour, I flew a diamond shaped box-kite (provided with keel for extra stability), and, attaching the line of 400 feet to a drag 30 feet long, and weighing 12 pounds, launched the apparatus from the beach at Brighton. A message, enclosed in a wooden bottle, was suspended from the body of the kite, asking for information from the finder, but no tidings have yet come to hand.

THE AUSTRIAN BALLOON VOYAGE ACROSS THE CHANNEL.

Prince Jaime de Bourbon and Party arriving at the Austrian Exhibition at Earls Court.

(By kind permission of the Editor of The Graphic)

On the 14th May, 1900, at 6.57 p.m., in a N by E wind, blowing about 25 miles an hour, I sent off, in the manner described above and from the same spot, a rhomboid box-kite, 5 feet 3 inches high, with message attached as before. This kite was flown on a line only some 200 feet long, and the drag in this instance weighed 6 pounds, and was of the length of 66 feet.

The voyage of this latter kite was entirely successful, as I heard from M. Costy, Chief Custom House Official at Vierville, Calvados, that it was sighted rapidly approaching the French coast, in the early morning of the 15th May, and that it eventually landed at 6.15 a.m., the flying line entangling itself in some brambles on the cliff.

The distance in a straight line from Brighton to Vierville is 103 miles, but no doubt the apparatus was taken out of its direct course by the strength of the tide, as when last seen from Brighton, the drag formed a considerable angle with the kite line.

I have to thank Mr. W. H. Dines for suggesting to me that the drag should take the form of a rope, with cork floats attached at intervals, Mr. J. Lecornu, of Caen, a member of the French Society of Aërial Navigation, for interesting himself in the matter, and M. Costy and the actual finders of the kite for their trouble and for sending me a photograph of the spot at which the kite landed.

P.S.—Since the above was written, Mr. Leopold Marquet, of Berck, Pas de Calais, France has been kind enough to inform me that kite No. 3, which left Brighton at 10.5 p.m. on June 1st, in a 20 mile an hour wind from the N W by W, fouled a fishing boat 1½ miles off Berck, at 4 p.m. the following day.

The distance from Brighton to Berck in a straight line is 75 miles, so that this kite, which was a light box with wings, travelled at a slower rate than kite No. 2.

Ballooning in Germany.

The fact that the German Aëronautical Societies consumed 202,200 cubic metres of gas for balloon trips from August 1st, 1904, to July 31st, 1905, shows that the popularity of balloon travelling in Germany is on the increase. The *New York Herald* recently published some interesting statistics concerning the spread of Aëronautical Clubs in Germany. It is stated that to the Deutscher Luftschiffer Verband (German Ballooning Association), belongs the credit of the successful results obtained in this direction in Germany during the last few years. The Association, which started on a small scale, now includes nine clubs, with a total of 2,743 members, compared with seven clubs and 2,177 members last year. The clubs are distributed throughout the German Empire as follows: The Berlin Club in Berlin; the Munich Club at Munich; the Oberrheinische Club at Strassburg; the Augsburger Club at Augsburg; the Niedenheinischer Club at Barmen; the Posener Club at Posen; the Ostdeutsche Club at Würzburg; and the Coblencer Club at Coblentz.

Over 156 trips have been made by the twelve balloons of the Association during the year mentioned above. The most important of these Clubs is the Berlin Club, whose President is Professor Geheimrat Busley, and its Secretary Captain Hildebrandt. At the commencement of 1906, the Berlin Club totalled 807 members, including 28 ladies. The Club can boast of five balloons for the use of its members. The Süring, 1,300 cubic mètres capacity; the Bezold, 1,300 cubic mètres; the Helmholtz, 1,300 cubic mètres; the Sigsfield, 1,300 cubic mètres; and the Ernst, 700 cubic mètres.

From 1904 to 1905, 84 ascents were made by 284 members of the Berlin Club, including five ladies. The longest journey being one by Captain von Krogh, whose balloon landed in Pinsk, in Russia, a little over 1,000 kilomètres from its point of departure.

The Berlin Ballooning Club will celebrate the 25th anniversary of its foundation during October this year, and a balloon festival is being prepared.

The same number of the *New York Herald* supplies some statistics which should tend to diminish the popular fallacy that ballooning is a specially dangerous pastime. According to Professor Busley, "during 2,061 balloon trips undertaken by 7,570 persons in the last few years, only 36 accidents occurred, or an average of one accident for every 57 trips. Persons injured only numbered 4.7 per cent. of the participants in the trips, and only one fatal accident has occurred to members of the Club since its existence, namely, to Captain von

Sigsfeld, in 1902, near Antwerp, when the gallant officer lost his life in the attempt to assist his companion, who escaped with slight injuries. It is a noteworthy fact, however, that balloon trips under military management in Germany, show a smaller percentage of accidents than trips undertaken by private persons."

Notes.

Cyclonic Observations by Balloons and Kites.—In an article in *Nature* on May 10th, Mr. W. H. Dines discusses the meteorological use of balloons and kites. He mentions that when Mr. Rotch first introduced observations by means of kites it was hoped that the long disputed point as to the origin of cyclones would be elucidated, but up to now this has not been done. Attention is called to the conflicting theories of Ferrel and Dr. Hann. The former supposed that cyclones were convectional effects, and that they were maintained chiefly by the latent heat of condensation of the vapour in the central rainy part. Dr. Hann thinks that cyclones are "driven eddies in the general circulation of the atmosphere." Certain observations made by balloons and kites on the Continent seem to support Dr. Hann's theory. but Mr. Clayton, of the Blue Hill Observatory, thinks that ascents made there give observations in favour of the convectional hypothesis. Mr. Dines states that the results of some two hundred kite ascents he has obtained in England and Scotland with an average height of one mile seem to give no evidence one way or the other. He thinks, however, that a fundamental error has generally been assumed in the discussion. "We know that in a gas in equilibrium under a conservative system of forces, the isothermal and isobaric surfaces must be identical; this point, at least, is not open to question. It is not, therefore, the proper test to consider whether the temperature in a cyclone is greater or less than in an anticyclone, at the same height, but the test is whether it be greater or less, at points on the same isobaric surfaces; and the isobaric surfaces in temperate latitudes may well differ from surfaces of equal height above mean sea level by a thousand feet or more."

The Kite Ascent of Four Miles.—A remarkable kite ascent was carried out lately by Dr. Assman, at the Lindenburg Aëronautical Observatory, in Germany. With a series of six kites, having a total area of 323 square feet, and employing nine miles of wire, a height of four miles was reached. At the highest point, the temperature was 13° F., that on the ground being 40.8° F. The velocity of the wind was 56 miles an hour, as against 18 miles in the lower strata.

The Balloon Railway.—In a recent issue of the *Daily Express* some details are given of Herr Baldermauer's balloon railway with which he has been experimenting in the mountains near Salzburg. This novel arrangement consists of a large captive balloon attached to a single rail. This is firmly fixed to the side of a steep mountain. The balloon remains balanced in the air about 10 yards above the rail to which it is attached by a stout wire cable, and it is moved up and down the side of the mountain at the will of the engineer. For the ascent the balloon filled with hydrogen furnishes the lifting power, for the descent a large reservoir is filled with water at the highest station. Ten persons can be accommodated in the circular car underneath the balloon. The wire cable from the balloon passes through the floor of the car to a speed regulator underneath controlled by the engineer. The balloon railway is designed to replace the Funicular Railway, but it may be asked, how it is likely to work in windy weather ?

Airship Evolutions in Washington.—The obedience of a navigable balloon to its helm in stagnant conditions of atmosphere was recently strikingly demonstrated in Washington when the Knabenshue airship twice circled round the Washington Monument and the dome of the Capitol. The feats were accomplished by Mr. Lincoln Beechey, who is Mr. Knabenshue's assistant. After ascending and sailing across the Potomac he first made for the monument, but had to alight on the ground to repair one of the bamboo poles in his car which had broken. He then again ascended, being, in the words of the *New York Herald*, "tossed into the air by his assistants," who followed him throughout the course in an automobile. In a spiral course he circled the monument twice, and then, having risen above it, started for the White House at a speed of 12 miles an hour. There was almost a dead calm, and after hovering for a few seconds over the grounds to the south of the Executive Mansion, he dropped easily on to the lawn, avoiding the trees, and landing within one hundred yards of the south entrance. On the machine being again launched it rose like a bird through the trees, poised for a second above the roof of the White House, where it described a circle almost within its own radius, and then started for the Capitol, following the line of Pennsylvania Avenue. In its course the aëronaut took advantage of the stagnant condition of atmosphere to display the steering power of the airship, and "showed off its paces, diving or shooting upward at stiff angles or cutting figure eights on a horizontal plane." When he arrived at the Capitol the Government business was stopped, and the senators hastened to see him twice round the dome of the Capitol and make a safe landing in the Capitol grounds.

Bird-like Flying Machines.—The experiments of Dr. Hutchinson appear to have stimulated other inventors to devise bird-like flying machines. *Science Siftings* describes two such constructions of French design. In M. Vrias' machine, which resembles a huge bird, there are four wings which are described as looking like the vanes of a windmill. These are attached to a light triangular frame-work mounted on a four-wheeled skeleton of a motor car. The motor and screw are placed in front, the driver being seated behind a steering apparatus similar in shape to that of an automobile. The total weight, including that of the driver, is 250 kilogrammes. When it is wished to ascend, the four wheels are set in motion. When a speed of 60 kilometres has been attained the screw is set working, and the machine is ready for flight.

The other machine is the joint invention of MM. Seux Berger and Pompeien Piraud, of Lyons. This has two articulated wings, and a movable head and tail. The frame-work is above the wings so that no resistance is opposed to the wind. The aëroplane measures 15½ mètres in length by 4 in breadth, and is moved by two propellers of 3.20 mètres in diameter. The 20 h.p. motor using petroleum weighs 70 kilogrammes, and the total weight of the machine is 250 kilogrammes.

The 'Automobile Volante,' M. Sergius Vuite's new flying machine, may be described as a combination of balloon and motor car. It is lightly but powerfully built, and is run by an 8-horse power motor of special construction. In starting for the flight the wings are kept rigid, and the automobile is run against the wind until the upward slide into the air is attained. Jointed rods transmit the power to the wings of the aëroplane. The tyres and springs of the automobile serve to break the descent of the machine.

The German Motor-driven War Balloon.—The *Illustrated London News* of June 30th gives a striking picture of Major Von Perseval's navigable balloon with which the German military authorities have been lately experimenting. There is, however, nothing very novel in its construction. For maintaining the rigidity of the gas bag the now well-known ballonet principle is adopted, air being pumped into two small balloons within the envelope by the same motor which drives the screw. The inventor, however, claims that his balloon can be deflated and packed up quicker than other constructions.

In the trials at Tegel by the military authorities precautions were taken to preserve secrecy, but the *New York Herald* of May 30th was able to state that during the first ascent which lasted only ten minutes, the airship manœuvred at a height of above 250 mètres, and was completely under control. A light east wind was blowing, and the balloon, with its motor working at half speed, turned in every direction and described figures of eight and spirals with great ease. The second ascent lasted 20 minutes, and a height of 450 mètres was reached. The same successful steering results appear to have been realised.

The Balloon and Train Collision.—A railway train in Germany lately experienced a unique kind of collision. Mr. Thomson, an English aëronaut, on June 19th ascended from the Zoological Gardens at Aix-la-Chapelle. Meeting with boisterous weather and losing some gas, the balloon got out of control and descended on the railway between Cologne and Herbesthal. The car, when approaching the ground, collided with a passing train. The car was knocked over and the aëronaut injured.

Balloon Chase in Switzerland.—A balloon automobile contest started from Zurich on June 18th last. Major Schaeck and Baron Sulzerwart, who ascended in the balloon "Mars," left, with imaginary despatches, the city of Zurich, which was supposed to be surrounded by hostile troops. The task of pursuing the balloon in automobiles and arresting the balloonists after landing was assigned to other officers. No less than twelve automobiles took part in the chase. The balloon was hidden by the clouds for two hours, and attained a height of 2,500 mètres. It reappeared, however, near Baden. It was then pursued by Herr Nabholz von Crabow in a Martini 40-horse power, but he was prevented by the nature of the ground from approaching to make the arrest in the specified time of 15 minutes after the descent. Therefore the balloon won the day. The chase is to be an annual event.

Foreign Aëronautical Publications.

(In this list a selection of some of the more notable articles is only given.)

L'AÉRONAUTE (Paris).

April, 1906.—Réservoir D'Hydrogène (C. Chavoutier).—Pour L'Aviation et L'Aérostation dirigeable (J. Leloup).—Elasticité et Légèreté (Jansen).—Le Bombardement de Venise (W. de Fonvielle).

May.—Graffond et Extenseur (Charles Chavoutier—Le Bombardement Aérostatique de Venise en 1849 (W. de Fonvielle).—Une Ascension Dramatique à New York.

L'AÉROPHILE (Paris).

April, 1906.—Langley, sa vie et son œuvre (O. Chanute).—Etude Expérimentale Méthodique de L'Aéroplane (V. Tatin).—Nouveaux essais de L'Aéroplane Vuia (Vuia).—Les Courses de diri-

géables (R. Gasnier).—Les dirigéables militaires em Allemagne (A. D. Masfrand).—La Coupe aéronautique Gordon Bennett (A. Cléry).

May—Portraits de Femmes Aéronautes Mme. Emile Carton et Mme. Valentine Carton (A. Cléry).—La Déperdition de Gaz des Aérostats par diffusion (Roger Aubry).—Ascension Scientifique Internationale du 7 Décembre, 1905 (Joseph Jaubert).—En Ballon Au-dessus de la Méditerranée (Francisco De P. Rojas).—L'Ascension de Cinquante-deux heures et demie (Dr. Kurt Wegener).

ILLUSTRIERTE AËRONAUTISCHE MITTEILUNGEN (Strassburg).

April, 1906.—Der Warmluftballon eine deutsche erfindung des Mittelalters (Franz Marie Feldhaus). Le dirigéable Lebaudy en 1905 (G. Esp.tallier).—Das Luftschiff des Grafen Von Zeppelin (Graf Von Zeppelin).

May.—Samuel Pierpoint Langley. (W. L. Moedebeck).—Ballonphotographie (E. Mittag).

June.—Die Ballonfabrik von August Riedinger (H. W. L. Moedebeck).—Die Einweihung des Luftschifferparks der Mailänder Ausstellung durch den König von Italien und unter Mitwirkung der deutschen Luftschifferabteilung.—Die 52 Stündige wissenschäftliche Ballonfahrt des Aëronautischen Observatoriums vom 5-7, April, 1906 (D. Alfred Wegener).

WIENER LUFTSCHIFFER-ZEITUNG (Vienna).

April, 1906.—Von Berlin Nach Schweden.—Paul Bordé.—Der Helicoptère Léger.—Die Ballonfahrten in Constantine.

May.—Ein neuer Weltrekord?—Professor S. P. Langley.—Die Mailänder Weltbewerbe.—Paul Pacher.—Louis Paul Cailletet.—Der Erfahungskoeffizient 2 der Luftwiderstandsformel.

BOLLETTINO DELLA SOCIETA AERONAUTICA ITALIANA (Rome).

March-April, 1906.—Samuel Pierpoint Langley (G Castagneris).—Le deformazioni Geometriche degli aerostati determinate sui loro Modelli (A. Crocco).—Motori per usi Aëronautici (O. Ricaldoni.—La Stabilità degli Aeroplani Secondo il Bryan col il Cap Ferber (Galletti).—Sulla determinazione degli elementi del vento (A. Pochettino).—La produzione industriale dell' idrogeno per uso aëronautico privato o militare (G. Castagneris).

Applications for Patents.

(Made in April and May, 1906.)

The following list of Applications for Patents connected with Aëronautics has been specially compiled for the AËRONAUTICAL JOURNAL by Messrs. BROMHEAD & Co., Patent Agents, 33, Cannon Street, London, E.C.

APRIL.

7933. April 2nd. ERMANO STOLFA. **Improvements in supporting and controlling vehicles travelling in air or water.**

8208. April 5th. ALAN FREDERIC SARGEAUNT. **Improved means for extinguishing fire on Motor Vehicles, Submarine and other Vessels, Air Ships and other portable structures wherein petrol or other highly inflammable material is stored.**

8308. April 11th. ARTHUR HENRY PHILIP BLUNT. **An Improved Flying Machine.**

8868. April 12th. WALLACE RUPERT TURNBULL. **Improvements in Aeroplanes and Hydroplanes.**

9045. April 17th. JOHN LAW GARSED. **Improvements in Aerial Machines.**

9804. April 26th. ADOLPH BRANDL. **Improvements in Flying Apparatus.**

9811. April 26th. CHARLES JOHN TOZER. **A Dirigible Plano-aerostat.**

10105. April 30th. HENRY LOVE. **Improvements in Aerial Machines.**

MAY.

10739. May 8th. WILLIAM COWELL SLY. **Improvements in connection with Aeroplanes for raising free and captive Flying Machines into the air.**

10758. May 8th. ALFRED JULIUS BOLT. **A device for the safe landing of Instruments or the like sent up in the air.**

10821. May 16th. MAURICE EDMUND ARNOLD WALLIS. **Improvements in the construction, mechanism, and action of Aeroplanes or Flying Machines.**

11219. May 18th. JAMES ROBSON. **Improvements in devices for steering Aeronautical Machines.**

11699. May 19th. CARL DIPPEL. **Improvements in and relating to Airships.**

11963. May 22nd. AUGUST VON PERSEVAL. **Improved method of suspending the Car of a Motor-propelled Balloon.**

JUNE.—Not any.